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TWO CASES OF THROMBOSIS OF THE LATERAL SINUS CONSEQUENT UPON PURULENT INFLAMAMTION OF THE MIDDLE EAR—OPENING OF SINUS—LIGATURE OF INTERNAL JUGULAR VEIN—RECOVERY, BY THOMAS BARR, M.D., AND J. H. NICOLL, M.B.

TWO CASES OF THROMBOSIS OF THE LATERAL SINUS CONSEQUENT UPON PURULENT INFLAMMATION OF THE MIDDLE EAR—OPENING OF SINUS—LIGATURE OF INTERNAL JUGULAR VEIN—RECOVERY.

By THOMAS BARR, M.D., and J. H. NICOLL, M.B.

I. *Case of purulent thrombosis of left lateral sinus in its whole extent, septic pneumonia of right lung going on to pulmonary abscess and gangrene, consequent upon chronic purulent otitis media. Gradual improvement after clearing out the lateral sinus and ligaturing the internal jugular vein.*

On the 17th June, 1899, Dr. Barr was called to see David D., aged 30, who had suffered from a discharge from the *left* ear, off and on, for 15 years. The disease was supposed to have been excited by the impact of a snowball. He had for years been in the habit of syringing the ear and insufflating boracic powder. Dr. Barr was informed that for three weeks previously the patient had suffered from pain in the ear so intense as to prevent sleep, that the left side of the head had been swollen for some days, and had been extremely tender to touch, but that this swelling had now disappeared; that there had been constant vomiting for several days with great thirst and loss of appetite; that the chief symptom, however, had been the occurrence for a week past of frequent and most severe rigors, during which, as his sister expressed it, "the bed shook and the teeth rattled." His sister, who had

attended him closely, believed that there had been at least twenty rigors, and that one had lasted 25 minutes, each of them being followed by very profuse perspiration. The temperatures taken by Dr. Alexander of Galston, the family physician, showed typical pyaemic fluctuations, ranging from 100° to 105°, according to the periods of the rigors. Anti-streptococcus serum had been injected twice during the previous week without apparent effect.

On examination the auditory meatus was found filled with granulation tissue, and from the meatus there was a discharge of fetid pus. The pain, which had formerly been worst in the ear, was now felt with greatest intensity in the frontal and occipital regions, while on pressure behind the mastoid area pretty severe pain was elicited. Additional important and ominous symptoms had shown themselves during the previous twenty-four hours, namely, rapid breathing, pain on the right side of the chest, and rusty expectoration. On auscultation crepitation was heard at the back of the *right* lung. Notwithstanding this grave complication, so unfavourable to the prospects of operation, it was thought right to give the patient a chance, and on the day following he was removed by ambulance waggon to the Glasgow Ear Hospital, a distance of twenty miles. Within an hour after his arrival at the hospital Dr. Barr operated on the mastoid. There was no external evidence of mastoid mischief, but, on making a long incision and reflecting the auricle and membrano-cartilaginous meatus well forward, the greater part of the postero-superior wall of the osseous meatus was found to be destroyed by caries: from this sprouted the granulation tissue which filled the meatus. On further removal of bone a large cavity, *packed with cholesteatomata*, was found to extend back to the posterior fossa of the cranium, and the cholesteatomata covered the sigmoid part of the lateral sinus, which was exposed by the disease over a considerable part of its extent. The cholesteatomata, with cario-necrotic debris and granulation tissue, were thoroughly removed: the sinus and dura mater were normal so far as colour, appearance, and touch were concerned.

For that and other reasons it was not considered desirable to open the sinus, but to wait and see the effect of this operation. The large opening was therefore simply treated by iodoform packing.

For the next eleven days, while only one rigor was observed, the temperature had wide ranges extending from 97° to 106°. The respirations were rapid relatively to the pulse, ranging from 28 to 36 in the minute, and the pulmonary condition developed with consolidation. The question during these days was, were these pyaemic temperatures connected with pus formation in the lungs, or were they due to continued septic infection from the sinus? Dr. J. H. Nicoll was asked by Dr. Barr to see the patient, and the question of ligaturing the internal jugular vein was seriously considered. Dr. Finlayson was also consulted (although he did not at this time see the case), but he was rather unfavourable to the proposal for ligaturing the vein in the presence of such a condition of the lung. However, the pyaemic temperatures continuing, it was decided that the internal jugular should be tied and the sinus freely opened, so as to avoid, if possible, any further infection.

On the 29th June, eleven days after the previous operation, Dr. Nicoll applied two ligatures to the left jugular at the level of the cricoid cartilage. The vein, which was left undivided between the ligatures, seemed collapsed and empty. Immediately afterwards Dr. Nicoll opened the sinus, which was found occupied by softened purulent thrombi, and there was no blood stream. The bone over the lateral sinus was removed as far as to the Torcular to the extent of an inch in breadth—a large amount of bone being in this way removed (see Fig. I.). The sinus, which was somewhat rough on its outer surface, was opened, and in almost its whole extent, from the jugular foramen to the Torcular, was found occupied by pus and thrombi. The patient bore these formidable operations well, and distinct improvement soon followed, as shown by lower temperatures and much less violent fluctuations. The condition of the right lung was the main source of anxiety; there was now purulent expectoration, but we were encouraged by the fact that Dr. Finlayson, who saw the

patient at this stage, expressed a favourable opinion of the prospects.

On the 16th July, a fresh complication was observed, in the form of a large abscess over the sacrum—where no pain had been complained of—the swelling being first observed by Dr. Finlayson while examining the back of the lungs. On the same evening a large quantity of matter was evacuated from this abscess, and it did not give much further trouble.

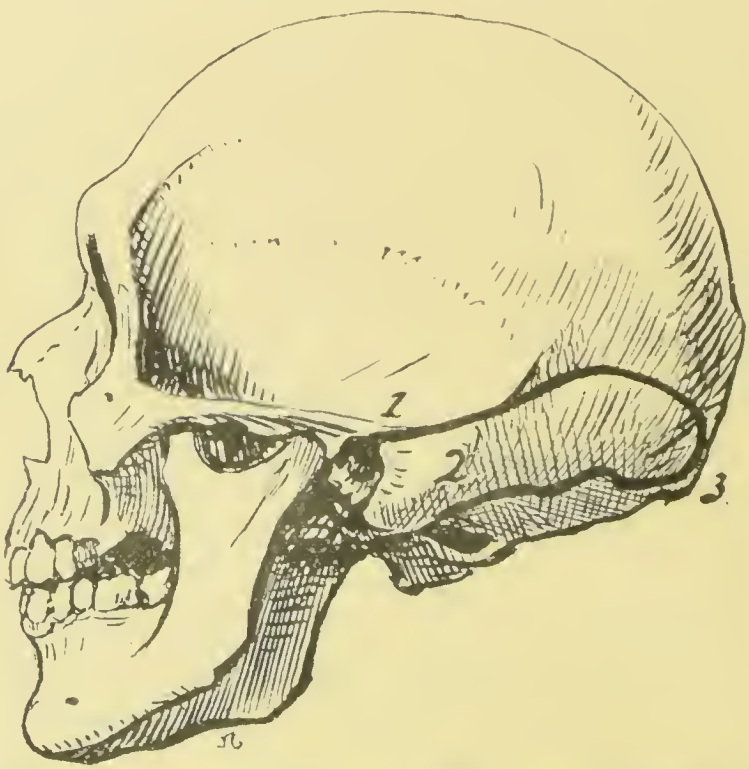

FIG. I.—Shows area of bone removed in order to expose the lateral sinus: (1) above auditory meatus, (2) over posterior border of mastoid, (3) opposite situation of Torcular.

At the end of July, a fortnight after the evacuation of the sacral abscess, the breathing somewhat suddenly became much more embarrassed, with distressing cough and pain in the right side of the chest, while the purulent expectoration became very profuse, to the extent of a cupful in the course of a night. The pulmonary distress continued, and the condition at the beginning of August resembled the advanced stage of phthisis pulmonalis—rapid breathing, extreme emaciation, hollow cheeks, great paroxysms of coughing with copious purulent expectoration, also high temperature and profuse

perspiration, but no rigors. In so far as the cranial condition was concerned everything seemed satisfactory—the wound in the scalp had been sutured and was now quite healed; we were confident that there could be no fresh infection from the sinus or ear. It was clear, however, that there were purulent foci in the right lung, resulting from septic infarctions. The left lung, however, still remained apparently unaffected, and we hoped that his strength might enable him to survive the terrible complication in his right lung. At this time Dr. John Rowan made an ophthalmoscopic examination, and found the "optic discs somewhat pale on the temporal sides and edges slightly indistinct, veins slightly full, fundi practically normal."

During the early part of the month of August he remained in somewhat the same condition, with the exception that the purulent expectoration, which continued copious, now emitted a gangrenous odour, especially when the patient lay on the left side; a whiff of air having a gangrenous odour was perceived during coughing. Yet as the month went on his general condition seemed to become no worse, but rather better. The temperature ranged from 99° to 102°, and the strength seemed to improve, with some diminution, though not great, in the purulent expectoration. The latter was examined bacteriologically and found to contain numerous chains of streptococci, but no tubercle bacilli. Towards the end of August the improvement seemed to be such as to justify his removal to his home in the country, partly with the hope that the change to the country air might be beneficial. He was removed on the 30th day of August, still expectorating pus, though in less quantity, but gaining in strength. The ear was entirely dry and the extensive incisions were completely healed over, the large gap in the bone was also filled with firm material. The temperature for a week before leaving the hospital ranged from normal in the morning to 100° in the evening.

The change to the country was beneficial, and he went on improving. The temperatures continued to be normal in the mornings and from 99° to 100° in the evenings. On the 14th

October Dr. Alexander sent the following notes: "David D. is now walking about daily, but is rather breathless on any exertion. He has practically no cough except in the mornings, the expectoration has diminished gradually, and now there is only a little mmmmular spit in the mornings, and this is entirely devoid of any gangrenous odour. He is now putting on flesh rapidly, and I should think that he must have increased to the extent of at least a stone. The temperature has only been taken in the morning, when it was normal. The physical signs over the left lung are quite normal, except that the respiratory murmur is rather puerile. Over the front of the right side there is no dulness, but on deep inspiration and on coughing there are still some crackling rales; over the back the rales are also present on deep inspiration, but *in the lower half of the right lung there is a large cavity* with loud rales. The rales all over the right side are diminishing gradually, and the lung is evidently healing up."

12*th November*, 1899.—Dr. Finlayson examined patient to-day and found no definite signs of cavity in the right lung, only dulness at certain places with some moist rales, also a want of due expansion on right side in front. Patient reports that there is scarcely any cough or expectoration. The most striking change is the notable increase of flesh. Instead of the emaciated phthisical look, he is quite full in the face and plump in the body. He thinks he has gained about two stones since the early part of his illness. There is a deep groove in the scalp extending from the mastoid to the external occipital protuberance, and the long gap in the bone seems to be converted into dense fibrous tissue (see Fig. II.). There is an aperture still remaining behind the auricle. This leads into a dry cavity which represents excavated mastoid, tympanum, and meatus. The purulent process in the ear seems to be entirely at an end. The temperature still rises somewhat in the evening, though normal in the morning. There is also some shortness of breath during exertion.

Observations.—The following points are worthy of emphasizing:—1. The serious significance of rigors, high temperature, pain behind the mastoid, sickness and vomiting in connection

with chronic purulent inflammation of the middle ear. 2. The vital importance in such cases of prompt and thorough removal of all sources of septic infection. 3. If the sinus be not opened at the time of the mastoid operation, this should not be long delayed, in the event of rigors or high temperature recurring afterwards; and *we must not hesitate in doing this, although*

FIG. II.—Photograph of patient's head, taken 4½ months after operation, showing depressed cutaneous scar over fibrous tissue occupying gap in skull left by removal of bone (indicated in Fig. I.). Behind the auricle there is a dry cavity remaining after the mastoid operation.

the outer surface of the sinus appears normal. 4. This case shows that, even when there is evidence of pulmonary mischief, such operations as ligature of the jugular and opening of the sinus may be safely and with advantage carried out. There is no doubt that distinct amelioration took place after these operations, and the patient owes his recovery, as far as that has taken place, to these operations in connection with the

preceding mastoid one. 5. While the ligature of the internal jugular vein may, by some, be still regarded as a debatable procedure in such cases, it is a wise precaution, as it diminishes the chance of purulent debris making its way into the circulation. Then the operation is the more justifiable as it is by no means a dangerous one in the hands of an experienced surgeon, and in thrombosed conditions of the lateral sinus.

II. *Case of extensive organized thrombus in right lateral sinus, connected with acute purulent otitis media and extra-dural suppuration. Ligature of internal jugular vein, opening of sinus, and removal of part of thrombus. Recovery.*

J. L., a gentleman aged 53, having a very healthy physique, consulted Dr. Barr on 20th May, 1899, owing to acute pain and throbbing in the right ear, of a few days' duration. The pain had come on just before a railway journey to London, and it was very severe while in London. Dr. Barr found acute otitis media, without, so far, any perforation. There was marked dulness of hearing; a watch, heard ordinarily at a distance of forty inches, was heard only one inch off. The left ear was also dull, and there were in the meatus of this ear several small exostotic growths.

The pain continued more or less for a fortnight, when profuse discharge appeared, with relief to the pain. Soon afterwards, however, the patient was seized, in Glasgow, with a severe rigor, and with difficulty he reached a friend's office, where the rigor continued for a considerable time. This was followed, when he got up to walk, by giddiness and staggering. On the same day he travelled home to Helensburgh, feeling in a dazed condition, and had to be taken to his house in a cab.

Soon afterwards pain was complained of behind the ear, and on visiting him at Helensburgh on 15th June, Dr. Barr found redness and swelling over the mastoid, which was also

painful on pressure. Under chloroform a free incision was made down to the bone ("Wilde's incision"). No pus appeared at the time, but in a few days matter began to come from the opening, while the discharge from the meatus ceased. The discharge from the wound continued, with the formation of granulation tissue, while the edges of the incision became much swollen and thickened. There was also a good deal of throbbing, and at times he seemed to have pain on pressure behind the mastoid in the region of the mastoid vein. There was, however, little or no elevation of temperature. The patient came up to the Glasgow Ear Hospital on 3rd August, and the mastoid surface was freely exposed. A very small orifice was found penetrating the cortex, just behind the bony meatus, lower down than the antrum, this orifice being evidently the source of the discharge. It was enlarged with the rotating burr and gauge, and a cavity of considerable size freely opened out. From this cavity granulation tissue and pus, with cario-necrotic debris, were thoroughly removed, and its walls were dusted with iodoform and boric acid, followed by packing with iodoform gauze. The meatus was evidently dry, and this had been the case for a considerable time. The gauze still continued to be saturated with pus at every dressing, although little or no pain was complained of. On 31st August, the patient being again placed under chloroform, the cavity was carefully explored, but no special source of the pus could be discovered beyond firm granulation tissue. The soft tissues over the bone were, however, still remarkably swollen.

The discharge persisted to the extent of soaking the dressings, and about a fortnight afterwards the patient had a distinct sensation of creeping cold over the body, not, however, amounting to a rigor. At this stage Dr. J. H. Nicoll first saw the case, and it was decided to make a further exploration in search of a source of the pus; this was done on the 18th September. Immediately before this operation the patient had another chilly feeling. A small orifice was at last found at the bottom of the cavity, leading to a fine canal extending somewhat deeply. More bone was removed and the canal

opened out as thoroughly as possible. It seemed to terminate in a pouch, and we supposed that the root of the matter had at last been reached. Three days afterwards a slight rigor was experienced, with elevation of temperature to 102°, the highest observed during the illness.

Pus still continued to soak the dressings, and on the 25th September the patient was again put under chloroform, and Dr. Nicoll removed the bone from over the sigmoid sinus and neighbouring dura mater to a considerable extent. The sinus presented a rather remarkable appearance, the whole sigmoid part with a portion of the horizontal being converted into a hard, round mass, covered with firm granulation tissue. The latter was carefully curetted away and a wedge of solid material (sinus wall and contained thrombus) was removed and examined by Dr. Teacher, who reported in the following terms: "In my opinion the structure is a mass of granulation tissue, for the most part in advanced stages of its conversion into fibrous tissue (practically scar tissue) which has replaced a thrombus. It must be a formation of considerable age." The source of the pus seemed to be the lower part of the sinus, and this was thoroughly exposed, the whole cavity being packed with iodoform gauze. From this onwards the case progressed favourably, the purulent discharge at length ceased, and the cavity became lined with healthy granulation tissue.

The propriety of ligaturing the internal jugular vein was now considered, and it was decided, in order to avoid any risk of systemic infection from possible purulent disintegration, especially at the lower part of the thrombus, to ligature the internal jugular vein, which was done by Dr. Nicoll on the 19th October. The patient after this made an uninterrupted recovery. The wound in the neck healed by first intention, and the cavity behind the ear is rapidly filling up, the interior of the ear being quite dry.

Observations.—1. The sequence of events in this case was probably the following:—Otitis media purulenta followed by abscess in the vertical portion of the mastoid, then by extra-dural or rather extra-sinus abscess, with thrombosis of the sinus and organization of its contents into connective tissue

2. A feature of this case as contrasted with the previous one was the comparative absence of rigors and high temperature. Only one well marked rigor occurred and other three slight ones, while the temperature only on one occasion reached 102°, and was nearly always under 100°.

3. This comparative absence of rigors and high temperature is probably accounted for by the effective closure of the sinus with firm thrombus, which, instead of undergoing purulent disintegration with systemic infection, became firmly organized into connective tissue.

4. It is probable that in an acute case purulent disintegration of the thrombus is less likely to take place than in a chronic case. Unfortunately there was no bacteriological examination of the inflammatory products, so that the nature of the micro-organism associated with this condition was not determined.